have the pubescence of the leaves at least partly villous. It is, however, hardly advisable to consider these specimens as representing a distinct variety or form, as the villous character of the pubescence does not seem to be very constant; sometimes the lower leaves of a shoot show a distinctly villous pubescence, while in the upper leaves all the hairs are straight and appressed. In the herbarium of the Arnold Arboretum and in the Gray Herbarium I have noted the following specimens as having the leaves on the under surface at least partly villous. NEWFOUNDLAND: St. John's, Aug. 1, 1894, *B. L. Robinson & H. Schrenck*, No. 217; Lark Harbour, August 7, 1896, *A. C. Waghorne*; Grand Lake, July 25–Aug. 15, 1906, *Owen Bryant*. QUEBEC: Roberval, Lake St. John, Aug. 22, 1895, *J. G. Jack*; Little Métis, July 17, 1906, *James Fowler*. ONTARIO: Kingston, Wolf Island, July 20, 1898, *James Fowler*.

ARNOLD ARBORETUM.

TWO NEW SPECIES OF UROMYCES ON CAREX.

FRANK D. KERN.

THE number of American species of *Uromyces* on *Carex* is apparently small compared with the number of similar species of *Puccinia*. Up to the present time only four such species of *Uromyces* have been described while there are more than four times as many such species of *Puccinia* known. A preliminary study indicates that there occur some *Uromyces* forms which have been previously undetected.

The *Carex* rusts have usually been considered especially difficult to distinguish and for that reason, perhaps, have not been so well studied or collected as the rusts of many other phanerogamic groups. There is a great similarity in the telial stages of these rusts and the failure to recognize properly the species may be the result of placing too much emphasis on the importance of this stage. Recent studies indicate that it is usually possible to find more distinctive morphological characters in the uredinia. Size of the urediniospores, color and thickness of walls, surface markings, and especially the number and arrangement of the germ-pores may all be taken into account.

A specimen of *Uromyces* on *Carex debilis* var. *Rudgei* from Connecticut has recently been studied which is very striking in the germ-pore character in that it has but one pore in a urediniospore. In this regard it is not only different from all other known *Carex* rusts, either *Uromyces* or *Puccinia*, but so far as the writer knows no species of rust (order Uredinales) has ever been observed, previously, with a single pore in the urediniospores. The location of the pore is also unusual being in the lower part of the spore near the hilum, the scar left by the fall of the pedicel. There are also other differentiating characters but on account of the very notable one of a single pore in the urediniospores a name has been selected specially to distinguish it in that regard. It may be characterized as follows:

Uromyces uniporulus n. sp. Urediniis hypophyllis, sparsis, punctiformibus, 0.1–0.3 mm. diam., mox nudis, pulvinatis, dilute castaneis; urediniosporis globosis v. subglobosis, 18–21 × 21–23 μ; episporio obscure cinnamomeo-brunneo, ca. 1.5 μ crasso, rare et distincte echinulato; poro germinationis 1, infra, hilo prope, instructo.

Teliis hypophyllis, sparsis, ovatis v. oblongis, 0.2–0.5 mm. longis, mox nudis, pulvinatis, obscure castaneis; teliosporis obovatis, 13–16 × 19–27 μ; episporio cinnamomeo-brunneo, ca. 1 μ crasso, apice incrassato (4–7 μ), levi.

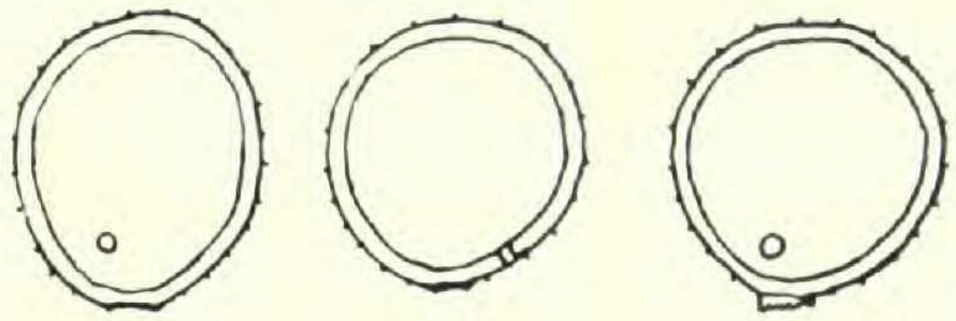

Fig. 1. Three urediniospores of *Uromyces uniporulus* showing the single pore in the lower part of the cell, near the hilum.

Hab. in foliis *Caricis debilis* var. *Rudgei*, Central Village, Connecticut, Aug. 19, 1908. *John L. Sheldon*.

The studies have also revealed another new species of *Uromyces* on *Carex* which has distinctive germ-pore characters. It has four equatorial pores, an arrangement fairly common in some groups of rusts, but seemingly rare in the *Carex* rusts. None of the other present known species of *Uromyces* on *Carex*, and only one similar species of *Puccinia* has this character. In addition to the microscopical characters this new species is distinctive in the gross appearance of the uredinia and telia. The sori, especially the telia, have an unusually strong development. The following name is here proposed with accompanying description.

Uromyces valens n. sp. Urediniis plerumque hypophyllis, sparsis, ovatis v. oblongis, 0.5–1 mm. longis, epidermide diutius tectis, pulverulentis, cinnamomeis; urediniosporis ellipsoideis, 16–19 × 19–26 μ,

epispório cinnamomeo-brunneo, ca. 1.5–2 μ crasso, distincte echinulato; poris germinationis 4 aequatorialibus instructis.

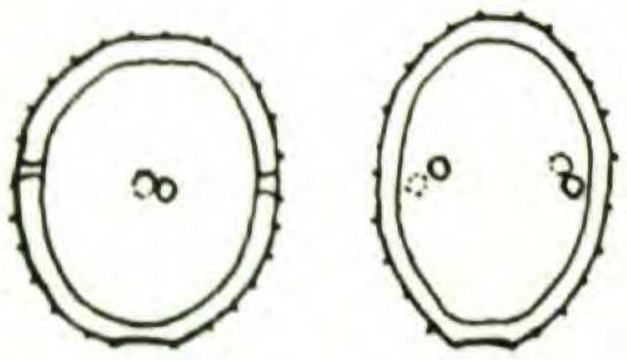

Fig. 2. Two urediniospores of *Uromyces valens* showing the four equatorial pores.

Teliis plerumque hypophyllis, sparsis, oblongis v. linearibus, 0.5–2 mm. longo, epidermide diu tectis, pulvinatis, atro-brunneis; teliospóris obovatis v. oblongo-obovatis, 16–23 × 26–39 μ; episporio casteneo-brunneo, ca. 1.5–2 μ crasso, apice incrassato (7–9 μ), levi.

Hab. in foliis *Caricis urtriculatae*, Mattsville, Indiana, Aug. 8, 1905, *Guy West Wilson, 5130.*

The following key based entirely on uredinial characters will serve to show how the present described American species of *Uromyces* on *Carex* may be identified.

Germ-pores equatorial.
  Germ-pores 4, urediniospores medium large, wall cinnamon-brown.
    U. valens Kern
  Germ-pores 2 (occasionally 3).
    Urediniospores medium large (15–19 × 19–26 μ).
      Wall light cinnamon-brown, finely verrucose-echinulate.
        U. Solidaginis-caricis Arth.
      Wall golden-brown, coarsely and sparsely echinulate.
        U. caricina E. & E.
    Urediniospores small (10–15 × 15–19 μ), wall golden-brown.
      U. minutus Diet.
Germ-pores extra-equatorial.
  Germ-pores 2, superequatorial, wall cinnamon-brown. *U. perigynius* Hals.
  Germ-pores 1, below, near the hilum, wall dark cinnamon-brown.
    U. uniporulus Kern.

Uromyces Solidaginis-caricis has been reported from Nova Scotia and Maine to Indiana and Wisconsin, and in Colorado. The telial hosts at present known are *Carex deflexa*, *C. flava*, *C. gracillima*, *C. lanuginosa*, and *C. pubescens*. Cultures of this species have been made showing its aecial stage to be on species of *Solidago*. The aecia have been collected in Maine on *Solidago rugosa* and in Indiana on an undetermined *Solidago*. *U. caricina* is known only on *Carex scoparia* from Delaware and New York. *U. minutus* is a southern species found along the gulf coast from Florida to Texas. *Carex triceps* is the only determined host upon which it has been found. *U. perigynius* is a little known species which has been collected only twice, once in Iowa and once in Wisconsin. Both collections are on *Carex intumescens*. *U. uniporulus* is known only from the type locality in New England. *Uromyces valens* occurs on *Carex lupulina* in addition

to *C. urticulata* but the range so far as known at present is restricted to central Indiana.

Much culture work needs to be done with the group. Only *U. Solidaginis-caricis* has been culturally connected with its aecial stage. There is no clue concerning the aecial relationship of the new species or of the other three discussed.

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PLANTS OF EASTERN MASSACHUSETTS FLOWERING IN APRIL, 1910.

The remarkably forward season, especially during early spring when the buds were expanding, has been commented upon very generally and it has seemed to several members of the New England Botanical Club desirable to place upon record a list of such plants of eastern Massachusetts as they have seen in flower or fruit during the month of April. The list is based upon the observations of only a few members, none of whom were often in the field, and as no attempt was made to secure "record" dates it is very certain that others will have notes of even earlier blooming, and probably some species to add to the list. As it stands, the list is a remarkable one for April in the Boston district. The records for April 23 (except for *Uvularia*) were made just north of the Massachusetts line in the town of New Ipswich, New Hampshire, but they are all of plants which extend along the wooded hills into Ashby or Ashburnham and southward. It is hoped that this list, though based on fragmentary records, will be of sufficient interest to call out further notes, that we may have a complete record for future reference of the early flowering species of 1910.

In the following list the dates, unless otherwise explained, are of the earliest flowers noticed, and the records, except for April 23, are all from within 20 miles of Boston. Some species without dates recorded had been seen in flower several times before the record of dates was seriously considered.

Poa annua (Apr. 2).
Eriophorum callitrix (29 or 30, in fruit in small sheltered bog).
Eriophorum gracile (29 or 30, in fruit in wet open meadows).
Carex stricta (30).